

## Claims

1. Method of storing data in a random access memory in which data words, which each comprise a predetermined number of data bits, are storable, *characterized in* that, before storage, an encryption of each data word (M) is effected whereby a permuted data word (P) with a predetermined number of data bits is generated from each data word (M), or from a data word (M) derived from this data word, by one-to-one permutation of the individual data bits ( $M[n-1]-M[0]$ ) using a first permutation key ( $M_p$ ).

2. Method according to Claim 1, in which the individual data bits ( $M[n-1]-M[0]$ ) of the permuted data word ( $M_p$ ) are substituted before storage using a first substitution key in order to provide an encrypted data word ( $M'$ ).

3. Method according to Claim 1, in which before rearrangement the individual data bits of the data word (M) are substituted using a first substitution key (S) in order to provide a substituted data word.

4. Method according to one of the foregoing claims, in which the permutation key (P) has a number of unique subkeys ( $P[n-1]-P[0]$ ) corresponding to the number n data bits, which subkeys are assigned to one data bit each ( $M_p[n-1]-M_p[0]$ ) of the permuted data word ( $M_p$ ), and which each indicate the data bit ( $M[n-1]-M[0]$ ) of the data word to be permuted (M), which data bit is to be mapped to this data bit ( $M_p[n-1]-M_p[0]$ ), wherein each subkey ( $P[n-1]-P[0]$ ) comprises a number of key bits ( $P[n-1,m-1]-P[n-1,0]$ ,  $P[k,m-1]-P[k,0]$ ,  $P[0,m-1]-P[0,0]$ ).

5. Method according to Claim 4, in which the mapping of a data bit ( $M[n-1]-M[0]$ ) of the data word to be permuted (M) to a data bit ( $M_p[k]$ ) of the permuted data word is effected incrementally using a subkey ( $P[k]$ ) by the following steps:

a) selecting a first group of data bits of the data word to be permuted ( $M_p$ ) as determined by a first key bit ( $P[k,0]$ ) of the subkey ( $P[k]$ );

b) selecting a second group of data bits from the first group of data bits obtained by the previous selection as determined by a second key bit ( $P[k,1]$ ) of the subkey ( $P[k]$ );

c) repeating step b), each time using an additional key bit ( $P[k,2]...P[k,m-1]$ ) until the selected group comprises only one more data bit which corresponds to the data bit ( $Mp[k]$ ) of the permuted data word ( $Mp$ ).

6. Method according to Claim 5, in which the number of data bits contained in a group of data bits is reduced from one step to the next by a factor of 2.

7. Method according to one of the foregoing claims, in which the first substitution key ( $S$ ) has a number of key bits ( $S[n-1]...S[0]$ ) corresponding to the number of data bits of the data word to be substituted ( $Mp$ ), wherein each data bit of the data word to be substituted ( $Mp$ ) is mapped unchanged or inverted to a data bit ( $M'[n-1]...M'[0]$ ) of the substituted data word ( $M'$ ) as determined by one of these key bits ( $S[n-1]...S[0]$ ).

8. Method according to one of the foregoing claims, in which the permutation key ( $P$ ) and the substitution key ( $S$ ) are regenerated before a rewriting to the memory after a deletion.

9. Method according to one of the foregoing claims, which in order to generate a permutation key ( $P$ ) comprises the following steps:

a) randomly generating a sub-permutation-key and assigning the subkey to a bit position of the permuted data word;

b) checking whether the generated sub-permutation-key has already been generated for another bit position of the permuted data word, and retaining the generated sub-permutation-key if it has not yet been generated, and rejecting the generated sub-permutation-key if it has already been generated;

c) implementing steps a) and b) until a subkey is generated for each bit position of the permuted data word ( $Mp$ ).

10. Method according to one of the foregoing claims, in which a data word ( $M'$ ), generated from a data word ( $M$ ) using the first key after being read out from the memory, is permuted in order to generate the data word using a second permutation key ( $P'$ ) which is matched to the first permutation key ( $P$ ).

11. Device to encrypt/decrypt a data word (M) comprising data bits ( $M[n-1]$ ,  $M[k]$ ,  $M[0]$ ), which device has a permutation unit (14) with the following features:

- data inputs to supply the data bits ( $M[n-1]$ ,  $M[k]$ ,  $M[0]$ ) of the data word to be permuted (M);
- outputs to supply the data bits ( $Mp[n-1]$ ,  $Mp[k]$ ,  $Mp[0]$ ) of a permuted data word ( $Mp$ ) of the predetermined length (n);
- permutation key inputs to supply a permutation key (P) which comprises a number (n) of subkeys ( $P[n-1]$ ...  $P[0]$ ) corresponding to the number of data bits;
- a number of selection units ( $14\_n-1$ ,  $14\_k$ ,  $14\_0$ ) corresponding to the number of data bits, to which selection units one subkey each is assigned and which provide one data bit each ( $Mp[n-1]$ ,  $Mp[k]$ ,  $Mp[0]$ ) of the permuted data word ( $Mp$ ) as determined by one each of the subkeys ( $P[n-1]$ ...  $P[0]$ ) from the data bits of the data word to be permuted (M).

12. Device according to Claim 11, in which each of the selection units ( $14\_k$ ) has a number of consecutively arranged selection stages ( $141\_n-1$ ,  $141\_k$ ,  $141\_0$ ) corresponding to the number of permutation key bits, wherein a first selection stage ( $141\_0$ ) is designed, as determined by a first key bit ( $P[k,0]$ ), to select and provide a first group of data bits from the data word to be permuted (M), and wherein subsequent selection stages ( $141\_1$ ,  $141\_2$ ,  $141\_m-1$ ) are designed, in each case as determined by a key bit ( $P[k,1]$ ,  $P[k,2]$ ,  $P[k,m-1]$ ), to select a subgroup from the group of data bits provided by the respective previous selection stage.

13. Device according to Claims 11 or 13, in which a substitution unit is connected before or after the permutation unit (14), which substitution unit substitutes data bits ( $Mp[n-1]$ ,  $Mp[k]$ ,  $Mp[0]$ ) of a data word to be substituted ( $Mp$ ) as determined by a substitution key (S).